KECHIKA ENHANCEMENT PROJECT

PROJECT WORKING PLAN FOR 1982 JANUARY - 1982 MARCH

Title: Effects of prescribed fire, wolf control, and transplants on populations of moose, Stone sheep, elk, and wolves in the Kechika Valley.

Location: Kechika River Valley (M.U.'s 7-51 and 7-52), 250 km west of Fort St. John.

Principal investigator: Dr. John Elliott, Regional Wildlife Biologist, Fort St. John.

Objective: To test the effectiveness of prescribed fire, wolf control, and transplants (elk only) in increasing populations of moose, Stone sheep, and elk.

Duration: 5 years (1982 March - 1986 December)

Budget: $225,000 (yr. 1 - $46,000; yr. 2 - $66,000; yr. 3 - $45,000; yr. 4 - $34,000; yr. 5 - $34,000). The total direct cost to the Ministry of Environment will be about $25,000, with project cooperators providing the remainder.

Cooperators: Ministry of Forests, Foundation of North American Wild Sheep, local guides and outfitters, Ministry of Environment.

SUMMARY

Current information is inadequate to choose the best options for increasing numbers of moose, Stone sheep, and elk in order to meet objectives for these species in northern British Columbia. For moose and sheep, low survival of young is the proximate factor limiting increases; in turn, this factor is apparently governed by inadequate food and wolf predation. For elk, the distance to sufficiently large herds appears responsible for the limited distribution and very low numbers in the study area. A research project is proposed for the Kechika River valley in order to test the effectiveness of three management options: prescribed fire, wolf control, and transplanting (for elk only). Eight treatment areas including undisturbed units, are described. Treatment methods and monitoring procedures are outlined. The total cost of the project is estimated at $225,000. The expected results will be used to guide management action for reaching objectives.

INTRODUCTION

In British Columbia, the demand for recreational uses of ungulates is expected to increase. Over the next 5 years, the proposed wildlife management plan for the province anticipates this rise with population objectives calling for increased numbers or at least, maintaining numbers where current trends would be downward without action (Table 1). The geographical distribution of these projected population increases is addressed specifically in regional and strategic plans now underway. This more detailed planning takes into consideration the important issues of quantifying the existing supply, assessing the factors that may limit supply, and evaluating opportunities to increase supply.

Table 1. Projected numbers of Stone sheep, moose, elk and wolves for the province, the Liard zone of Region 7 and the Kechika study area, assuming existing levels of funding.

		Estimated* numbers of:			
Area	Year	Moose	Stone sheep	Elk	Wolves
B.C.	1982	240,000	12,000	18,000	6,000
	1987	300,000	13,000	22,000	6,000
Liard	1982	45,000	8,000	5,000	900
	1987	45,000	8,000	6,000	900
Kechika	1982	6,000	2,500	<50	50-100
	1987	>8,000	3,200	250	25-50

*estimates are believed to be accurate within ±25%.

The role of the Liard zone of Region 7 (Omineca-Peace) in meeting provincial objectives has already been considered, especially those species for which this area has a high capability--moose, Stone sheep, elk, and wolf. Initial projections are presented as part of Table 1. Whether or not these projections are reached depends critically on two steps: (1) correctly diagnosing those factors that are currently preventing numbers from increasing and, (2) taking steps to remove or reduce their effect.

The principal, immediate factor limiting increases appears to be low recruitment. This diagnosis is based on extensive surveys during the past three years of many herds of moose, Stone sheep, and elk in northeastern B.C. Low recruitment appears to result from an interaction of three causes: food, predation, and adverse weather. (Lack of elk in suitable habitat appears due to small herd sizes and low numbers of colonizers.) Of these three causes, the latter is beyond management's control. The remaining two can be addressed in four possible ways in order to meet management objectives:

1. do nothing
2. control predators

3. enhance habitat
4. combinations of the above

In addition, transplants can be used to provide a nucleus for a new herd in vacant habitat. The choice of options depends upon an evaluation of the interaction and relative importance of limiting factors, the cost-effectiveness of options, and relevant government policies, that is, an evaluation of ecological, economic and socio-political aspects.

At this time, the ecological and economic aspects are not well enough known to select the most effective management options. Previous work has suggested that predators, especially wolves, can limit the growth of prey populations in northern latitudes (Bergerud 1978, Davis et al. 1978; see also a general review on predators by Connolly (1978)). Habitat enhancement through prescribed fire has lead to increased numbers of moose, Stone sheep, and elk. Horn growth has been stimulated in Stone sheep that have grazed burned ranges (Elliott 1978). Also, transplanting can be effective in increasing numbers where suitable habitat appears to be unoccupied. However, for areas like the Kechika, the most effective course of action in unclear.

Consequently, it is proposed to conduct a research project whose principal purpose is to test the effectiveness of options in order to guide future management actions in the northern parts of Region 7. Necessarily, effectiveness will be judged from ecologic and economic perspectives. Results of the research will provide benefit/cost data that can be used for optimal allocation of funds towards achieving management objectives.

STUDY AREAS

The general study area is the Kechika River valley, approximately 250 km west of Fort Nelson (Fig. 1). The area includes parts of Management Units 7-51 and 7-52, and covers about 10,000 km^2. A favorable combination of landforms, climate, soils, and vegetation has made the Kechika area one of high capability for the ungulates moose, Stone sheep, and potentially elk. Of the other ungulates, caribou and mountain goat occur in smaller numbers; mule deer are uncommon.

A total of eight treatment units or areas is located within the general Kechika study area (Fig. 1). For moose, the treatment areas are known as Gemini, Hornline, Forsberg and Cottonwood. For Stone sheep, the treatment areas are Sandpile, Major Hart, Blue Sheep, and Moodie. These treatment units total 6,200 km^2, ranging from Major Hart and Sandpile, the smallest ones, to Moodie, the largest (Table 2). Treatment unit boundaries and sizes will be refined during initial field work. The transplant site for elk is called Scoop Lake, located within the Cottonwood treatment unit.

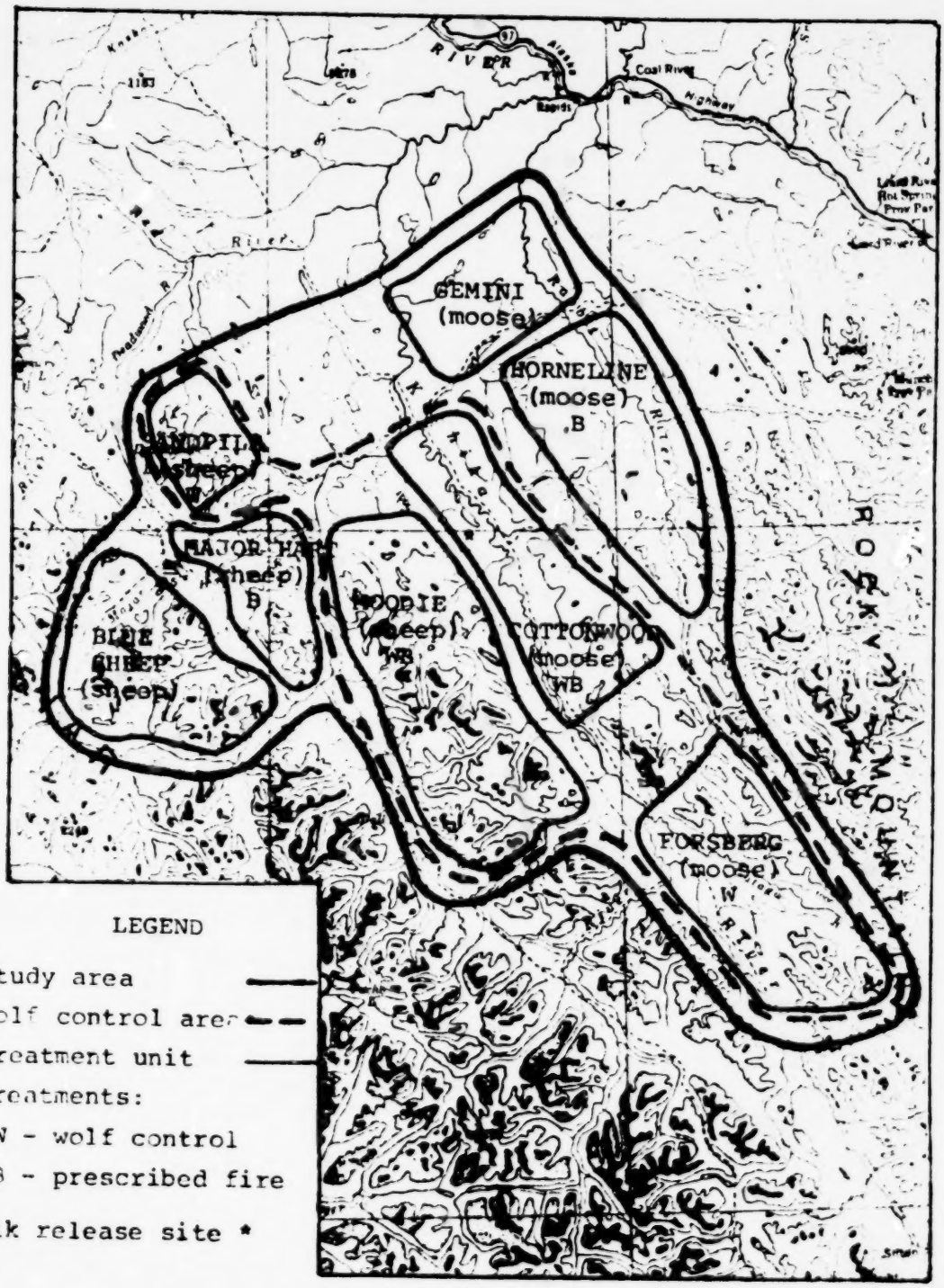

Fig. 1. Map of the Kechika study area showing name, location key species and treatment type for treatment areas, and release site for elk. Scale 1:1,000,000.

METHODS

STUDY DESIGN

Basically, the study design is an arrangement of all treatment combinations with single replicates for moose and for Stone sheep (Table 2). Thus the design should allow an assessment of the effect of treatments singly or in combination for both species of ungulates over the planned five year life of the project. The statistical analyses to be used are presently being reviewed and will be described in the next working plan.

Table 2. Key species, treatment type, name and size of treatment areas for the Kechika enhancement project.

Species	Treatment		Study area	Approximate size (km^2)
	Wolf control	Prescribed fire		
moose	no	no	Gemini	600
	no	yes	Hornline	900
	yes	no	Forsberg	1,000
	yes	yes	Cottonwood	1,000
Stone sheep	no	no	Blue Sheep	700
	no	yes	Major Hart	300
	yes	no	Sandpile	300
	yes	yes	Moodie	1,400

The release site for elk at Scoop Lake is in the Cottonwood treatment unit, the one that receives wolf control and prescribed burning. Evaluation of the response of elk will be made by general comparisons with elk herds elsewhere in the Liard zone that experience predation by wolves and that occur on unburned ranges. The nature of the elk introduction, i.e., only at one release site, means that the evaluation of treatment effects will not be as complete as for moose and Stone sheep.

Study area boundaries shown in Fig. 1 will be refined during the initial field work to ensure that a buffer strip at least 8 km wide exists between treatment areas, and that wolf pack territories will be contained within the appropriate treatment unit.

MONITORING

This section describes the methods proposed to monitor the population responses of the four target species. In all monitoring activities, exact timing will be determined by weather and snow conditions, animal distribution, and logistic considerations. The monitoring will continue for the project's duration and longer, if necessary, to interpret findings.

Moose

The objective of monitoring moose will be to estimate the survival of young to the ages of 6, 10 and 18 months. Population estimates will not be attempted due to their insensitivity to changes in numbers, at least with current methodology and funding. Two fixed wing surveys will be made, one in December to estimate sex ratios and to estimate survival to 6 and 18 months; and one in March to estimate survival to 10 months. For both surveys, the aim will be to classify at least 75-100 adults/study area. Also, every attempt will be made to minimize biased estimates than can result when areas are not surveyed properly, e.g., flying only low elevations and missing bulls on upper slopes. Data will be expressed as young/100 females.

Stone Sheep

The objective of monitoring Stone sheep will be to estimate the proportions of 10 month and 22 month old young to adult ewes. Population estimates will not be attempted (see previous paragraph on moose). Recruitment estimates will be obtained through helicopter surveys of sheep bands in March. Due to the timing of these surveys, estimates of populations and sex ratios will not be determinable. As with moose, attempts will be made to classify 75-100 animals, although slightly smaller samples than this may occur in the smaller bands. Data will be expressed as young/adult female.

Elk

Monitoring of elk will be done to estimate population size, adult sex ratio, and survival of young to 10 and 22 months of age. These estimates will be obtained from surveys by fixed wing aircraft in March. The late drop of antlers in elk enables the sex ratio to be determined in March rather than in December, as is the case for moose. The location of the elk herds will be facilitated by the use of radio telemetry (see Treatment section).

Wolf

Wolves will be monitored to determine total numbers, pack size, movements and distribution and, if possible, a crude estimate of pack territory size. These data will be gathered by fixed wing aircraft and helicopter surveys in late February or March, after the breeding season but prior to any control. After control, one or two monitoring flights are planned to confirm the level of control achieved, and to detect possible movements of wolf packs between treatment units.

TREATMENTS

Three treatments are proposed: wolf control, prescribed fire, and transplants (elk only). The aim of the wolf control treatment will be to remove all wolves from the specified treatment areas. Since 100% removal is not usually achieved, a removal of a minimum of 75% will be considered as a level of control sufficient to cause a response, if one should occur.

Wolf Control

Wolves will be killed by aerial gunning from a helicopter, with a fixed wing aircraft used where possible to initially locate wolf packs. The applicable Ministerial policies, procedures, and regulations will be followed. This method of control was selected over trapping because the open nature of the terrain and forest cover in the study area made control by this method feasible. Also, trapping was thought to be unfeasible, given the lack of ground access and the need for removal of specific packs. Poisoning by 1080 was not proposed as a control method because its effectiveness is difficult to evaluate rigorously: carcasses are not usually recovered. Also, it is most costly to apply in the study area where access is primarily by aircraft.

Wolf carcasses will be recovered for necropsy. Each carcass will be weighed, sexed, and aged. Skulls will be collected and lodged with the provincial museum for future taxonomic study. Female reproductive tracts will be collected and analysed to determine reproductive status, litter size and reproductive history, if possible. Additional analyses, such as for parasites and diet, will be attempted where possible.

The wolf control will be conducted in late February or March, after the breeding season. It is proposed to repeat the control program for a minimum of three years. At that time, the population response of the target ungulates will be critically assessed. If no response is apparent, control will stop and monitoring will be continued for the remaining two years of the program. If responses are apparent, then control may be continued for another two years, depending on the nature and magnitude of the response by both ungulates and wolves.

Prescribed Fire

For sheep and elk habitat, the purpose of burning is to remove woody vegetation so that it will improve existing range and create new range adjacent to it, that is, enhancement and expansion of range. Specifically, the expected responses are increased production of grass forage species and increased removal rates of snow through greater exposure to sun and wind action.

Burns will be sited primarily on fall and spring ranges and, to a lesser extent, on winter ranges. As much as possible, burning will be done in the spring as soon as conditions permit. All burns will be conducted in accordance with the protocol agreement on prescribed fire between the Ministries of Environment and Forests.

Vegetation responses to burning will be recorded by study of 1 - 3 representative sites in burned and unburned locations on each treatment area. Each study site will be characterized, generally following methods outlined by Walmsley et al. (1980). In addition, plant productivity will be assessed on an air-dried weight basis, by clipping 1-3, 1 sq m plots/site. Qualitative evaluation will be based on

analyses of forage samples for crude protein, digestibility, and probably important inorganic nutrients. Photographs will be taken of each study site as well as the general burn area. Fecal samples will be collected and analyzed for crude protein to estimate difference in diet protein of the three ungulates.

For moose habitat enhancement, the objective is to remove overmature shrubby vegetation and so stimulate growth of young shoots. This action should increase the amount and nutritive value of available browse. At this time, details of the monitoring have not been finalized, but in general it will parallel that used on the sheep and elk ranges but with the emphasis on shrubs rather than herbs.

An annual burning program is planned over the five years of the study. The target is to burn 4,000 to 16,000 ha annually, divided approximately equally between sheep and elk/moose habitats. Actual areas burned, however, will be influenced by several factors such as funding, weather conditions, and logistics.

Transplanting

This treatment applies only to elk. As with the prescribed fire work, the transplant operation will be conducted in accordance with Ministry of Environment policies and procedures.

The transplant will consist of approximately 100 animals (80% females and young, 20% males) obtained from Elk Island National Park and supplemented, if necessary, by elk from herds in northern B.C. Plans call for elk to be trucked to Fort Nelson, held for observation and supplemental feeding, and then air-lifted to the release site, Scoop Lake.

In order to assess the dispersal of released elk, five adult cows will be fitted with neck collars to which are attached radio transmitters. Locations of radio-collared elk will be made from fixed-wing aircraft every 2-3 months. These radio collars should increase efficiency of the population monitoring activities, especially since the areas on which elk will settle is unknown.

BUDGET

This section describes the estimated cost of each component of the study by year and source of funds, over the planned five year life of the project. The projected five year cost is $225,000 - $250,000 (Table 3). Average project costs are estimated at about $40,000/year, with an extra $22,000 allocated for the elk transplant and the associated telemetry equipment.

Table 3. Estimated annual budget for the project by activity, year, and source of funds (direct costs only).

Activity	Cost estimate ($'000)					Total cost
	1981-82	1982-83	1983-84	1984-85	1985-86	
MONITORING						
elk		2	1	1	1	5*
moose	2	2	2	2	2	10**
sheep	2	2	2	2	2	10***
wolf	2	2	2	2	2	10**
vegetation	1	1	1	?	?	3**
TREATMENT						
wolf control	10	10	10	?	?	30+
fire (moose)	17	17	17	17	17	85++
fire (sheep)	10	10	10	10	10	50***
transplant (elk)	2	20				22*
TOTALS	46+++	66	45	34	34	225

* transplant and monitoring elk costs provided by local outfitters ($20,000) and Ministry of Environment ($2,000).
** funds from Ministry of Environment.
*** funds from Foundation of North American Wild Sheep.
\+ funds from local guides.
++ funds primarily from Ministry of Forests (tentative).
+++ some of these funds will be spent in 1982-83.

In all cases, monies provided from non-government sources will be dispersed by organizations independent of the provincial government.

Costs to the Ministry of Environment are low compared to the overall budget. Regional staff estimate that the annual direct cost will be about $5,000. Indirect costs, in the form of staff time and travel will likely be 2-3 man-months annually.

SCHEDULING

Over a typical year, project activities will take place at six times. In April-May, time will be allocated to prepare an annual report and a working plan for the coming year. Prescribed burning is planned for May or June, depending on snow melt, weather, and plant phenology. The first monitoring flight for moose is scheduled for December. The remaining monitoring flights for all species will be conducted in late February or early March. Wolf control will occur in March. The final activity will be follow-up monitoring of wolves after control, in April-May.

In the final year of the project, additional time will be allocated for preparing a job completion report. It is expected that this task will take staff time partly into the following fiscal year of 1986/87 before the report is finally completed.

RESULTS AND REPORTS

The main result expected from this project is information that will guide wildlife managers in allocating money and effort to the various wildlife enhancement techniques. This information will include an evaluation of responses of animal populations and cost/benefit ratios, to the extent possible.

The planned reports and reporting schedule is as follows:

Working plan:	due annually in March-April
Progress report:	due annually in March-April
Job completion report:	due December 1986
Management recommendations:	as appropriate, with a final submission in 1986

It is expected that large changes (e.g., ± 50%) in survival must be demonstrated before making management recommendations.

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PREPARED BY:

Date:

Regional Wildlife Biologist, Fort St. John

APPROVED BY:

Regional Manager, Fish and Wildlife
Ministry of Environment, Prince George

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Biologist in-charge, Wildlife Research
Fish and Wildlife Branch
Ministry of Environment, Victoria